UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/644,555	08/20/2003	Atsushi Shozude	19036/39398	6655

4743 7590 05/26/2005

MARSHALL, GERSTEIN & BORUN LLP
233 S. WACKER DRIVE, SUITE 6300
SEARS TOWER
CHICAGO, IL 60606

EXAMINER	
CHANG, AUDREY Y	

ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 05/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/644,555	SHOZUDE ET AL.	
	Examiner	Art Unit	
	Audrey Y. Chang	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,7-20 and 23-27* is/are pending in the application.

4a) Of the above claim(s) *10-17 and 23-27* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7-9 and 18-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendment filed on March 25, 2005, which has been entered into the file.
- By this amendment, the applicant has amended claims 1, 7-8, 18 and 20 and has canceled claims 6, 21 and 22.
- **Claims 10-17, and 23-27 are withdrawn** from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species there being no allowable generic or linking claim. Election was made **without** traverse in Paper filed on September 13, 2004.
- Claims 1-5, 7-9 and 18-20 remain pending in this application.

Claim Objections

1. **Claims 1-5, 7-9, and 18-26 are objected to because of the following informalities**:

(1). **Claims 1 and 18 have been amended** to include the phrase "a third layer as a layer *next to an outermost layer* which is situated *most remotely from the second film*" that is confusing and indefinite since it is not clear what is considered to be the **outermost** layer. If there is already an **outermost** layer then what is this third film?

(2). **Claim 18 has been amended** to include the phrase "said group" that is confusing and indefinite since it lacks proper antecedent basis from earlier part of the claim.

(3). Claim 18 is also confusing and indefinite concerning the steps of forming the films. It is not clear if the third film is next to an *outermost* layer and a *most remote layer* from the *substrate* why is then the third film is *directly* formed *on the substrate* as recited in the steps stated in the claim. Where are other films when the third film is being formed? Clarifications are required.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-5, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Sato et al (PN. 5,181,141) in view of the patents issued to Ichikawa (PN. 4,988,164) and Rahn (PN. 5,764,416).

Sato et al teaches an *anti-reflection optical element* that is comprised of a *plastic optical element*, serves as the *substrate*, a *foundation layer* serves as the *first film*, a *low refractive index layer*, serves as the *second film* and a *multi-layer film* that is having an anti-*reflective characteristics, formed on the second film* (please see Figure 3). Sato et al teaches that the substrate or the plastics optical element is made of *synthetic resin*, (please see column 3). Sato et al also teaches that the foundation layer and the low refractive index layer, serves as the second film, *formed on* the *surface* of the foundation layer, are **both** made of the *silicon dioxide*, which known in the art has refractive index between 1.45 to 1.5, (please see column 5, lines 50-55 and column 8, lines 1-7). Sato et al also teaches **explicitly** the foundation layer is formed *directly* on the optical element or the substrate to enhance the adhesion between the substrate and the multi-layer film including the low refractive index layer as the second film, (please see column 8, lines 4-7).

This reference has met all the limitations of the claims with the exception that this reference does not teach explicitly that the refractive index of the foundation layer or the first film is the same as the refractive index of the substrate. However it is a common knowledge in the art to make layer materials

having *matching refractive index* to reduce unwanted reflection at the interface. It is known in the art that the film structure is not desired to have reflection of light occurs at the interface between the substrate and the foundation layer, since the interference between the reflected light to provide anti-reflection property is not designed to occur at the interface. It would then have been obvious to one skilled in the art to select an resin material having refractive index equals to the refractive index of the foundation layer or first film to serve as the substrate for the benefit of reducing unwanted reflection occurred at the interface. Furthermore, with respect to claim 3, **Ichikawa** in the same field of endeavor teaches an anti-reflection film for synthetic resin optical element wherein *acrylic resin* having a refractive index of 1.49 is used as the substrate or the optical element and having the anti-reflection film formed upon it. It would then have been obvious to one skilled in the art to apply the teachings of **Ichikawa** to use *acrylic resin* as the synthetic resin for the substrate for the benefit of matching the refractive index between the substrate and the foundation layer or first film to reduce possible noise occurs at the interface since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended used as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Claim 1 has been amended to include the feature that the multi-layered film has a third film and the third film has a refractive index assuming value within the range from 2.2 to 2.4. **Sato** et al teaches that the multi-layer anti-reflective film comprises a high/low refractive index layer alternative arrangement (with regard to claim 5) and comprises a third layer material, namely the high refractive index layer, that is made of *tantalum oxide* (Ta_2O_5), *zirconium oxide* (ZrO_2) or mixture of them, (please see column 5, line 42 to column 6 line 12). However it does not teach explicitly that the refractive index of the third layer is having a value within the range of 2.2 to 2.4. But one skilled in the art would have the knowledge that the refractive index of the layer material used in the high/low refractive index multi-layered film is a factor for designing the multi-layered film to have the desired optical characteristics such as the reflection/transmission spectrum. It is also well known in the art that the layer materials such as

titanium oxides (TiO_2), *tantalum oxide* (Ta_2O_5), and *zirconium oxide* (ZrO_2) are **widely** used in the art as high refractive index layer material for the multi-layered *antireflective* coating, as explicitly taught by **Rahn,** (please see the abstract, column 2, lines 35-40, column 3, lines 40-45, tables 1-2). It would then have been obvious to one skilled in the art to select the suitable material such as titanium oxides, (which has refractive index around 2.3) alternatively, as the high refractive index layer or the third film for the benefit of making the antireflective film having the desired optical characteristics. It also has been held that it is within the general skill of a worker in the art to select *a known material* on the basis of its suitability for the intended used as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

With regard to claim 4, the *product by process limitation* of the claim is not given any patentable weight for the process limitation-- vacuum deposition is very well known layer forming process in the art and it *does not* distinguish the product namely the anti-reflection film of the instant application from the prior art anti-reflection film. Nevertheless, Sato et al teaches that the foundation layer and the multi-layer film including the second film can be formed by standard vapor deposition or *vacuum deposition* process, (please see column 6, lines 23-28). **Ichikawa** further teaches that the oxide layers for the anti-reflective film including the silicon dioxide layer can be formed by vacuum deposition process using *resistance heating*, (please see Figure 2). It would then have been obvious to one skilled in the art to apply the teachings of both **Sato** et al and **Ichikawa** to use standard vacuum deposition with resistance heating process to deposit the oxide layer for it is well know and standard practice in the art to form the film with this process.

4. Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Sato et al, Ichikawa and Rahn as applied to claim 1 above, and further in view of the patent issued to Nakahigashi et al (PN. 5,562,952).

The anti-reflective film taught by **Sato** et al in combination with the teachings of **Ichikawa and Rahn** as described for claim 1 above have met all the limitations of the claims.

With regard to claims 8-9, the *product-by-process limitations* concerning the forming process of the third film are not given any patentable weight since the process relined upon, namely the *plasma deposition process* is rather well known process in the art, and the process limitations **do not distinguish** the final product, namely the high refractive index layer formed in the multi-layer anti-reflective film, of the instant application from the prior art. Nevertheless, the features have been addressed in the previous Office Action with regard to the method claims and the reasons for rejection are therefore repeated as follows.

Sato et al teaches that the layer in the multi-layer anti-reflection film can be formed by vapor deposition process or vacuum deposition process, however it does not teach explicitly that it can also be formed by the plasma CVD process.

Nakahigashi et al in the same field of endeavor teaches that plasma *CVD film deposition method* is quite well known in the art. The process and the apparatus can be used to deposit film layer such as zirconium oxide (ZrO_2), tantalum oxide (Ta_2O_5) and titanium dioxide (TiO_2), (please see column 6, lines 60-62). The plasma CVD deposition apparatus and method including a *vacuum chamber* (10, Figures 15-16), an *electrode* (20) having a *substrate* (S1) placed on it, a film forming material is evaporated within the chamber using gas source supply (40) and an *radio* frequency power source (320) applied at the supply electrode (30) to convert the gas to *plasma* within the chamber, (please see columns 1-3). Nakahigashi et al teaches that the RF power is of a frequency of 13.56MHz. It would then have been obvious to one skilled in the art to use the standard plasma CVD film deposition process to deposit the high refractive index layer of the anti-reflective layer as an alternative method for forming the anti-reflection film since both the vacuum deposition method and plasma CVD deposition method are well known film forming process in the art to use one over the other would have been obvious matters of

design choice to one skilled in the art. The bias voltage value for the RF power source as recited in claim 9 is considered to be either inherently met by the disclosure for actually forming the layer, or an obvious matters of design choice to one skilled in the art for the benefit of selecting the voltage value to complete the deposition process. Since it has been held when the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

5. Claims 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Sato et al (PN. 5,181,141) in view of the patents issued to Ichikawa (PN. 4,988,164) and Nakahigashi et al (PN. 5,562,952).

Claim 18 has been significantly amended and it necessitates the new grounds of rejections.

Sato et al teaches an *anti-reflection optical element* that is comprised of a *plastic optical element*, serves as the *substrate*, a *foundation layer* serves as the *first film*, a *low refractive index layer*, serves as the *second film* and a *multi-layer film* that is having an anti-*reflective characteristics, formed on the second film* (please see Figure 3). It is implicitly true that each of the films has a predetermined thickness. Sato et al teaches that the substrate or the plastics optical element is made of *synthetic resin*, (please see column 3). Sato et al also teaches that the foundation layer and the low refractive index layer, serves as the second film, *formed on* the *surface* of the foundation layer, are **both** made of the *silicon dioxide*, which known in the art has refractive index between 1.45 to 1.5, (please see column 5, lines 50-55 and column 8, lines 1-7). Furthermore, Sato et al teaches **explicitly** the foundation layer is formed *directly* on the optical element or the substrate to enhance the adhesion between the substrate and the multi-layer film including the low refractive index layer as the second film, (please see column 8, lines 4-7).

This reference has met all the limitations of the claims with the exception that this reference does not teach explicitly that the refractive index of the foundation layer or the first film is the same as the refractive index of the substrate. However it is a common knowledge in the art to make layer materials having *matching refractive index* to reduce unwanted reflection at the interface. It is known in the art that the film structure is not desired to have reflection of light occurs at the interface between the substrate and the foundation layer, since the interference between the reflected light to provide anti-reflection property is not designed to occur at the interface. It would then have been obvious to one skilled in the art to select an resin material having refractive index equals to the refractive index of the foundation layer or first film to serve as the substrate for the benefit of reducing unwanted reflection occurred at the interface. Furthermore, **Ichikawa** in the same field of endeavor teaches an anti-reflection film for synthetic resin optical element wherein *acrylic resin* having a refractive index of 1.49 is used as the substrate or the optical element and having the anti-reflection film formed upon it. It would then have been obvious to one skilled in the art to apply the teachings of **Ichikawa** to use *acrylic resin* as the synthetic resin for the substrate for the benefit of matching the refractive index between the substrate and the foundation layer or first film to reduce possible noise occurs at the interface since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended used as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Sato et al further teaches that the foundation layer and the multi-layer film including the second film can be formed by standard vapor deposition or *vacuum deposition* process, (please see column 6, lines 23-28). **Ichikawa** further teaches that the oxide layers for the anti-reflective film including the silicon dioxide layer can be formed by vacuum deposition process using *resistance heating*, (please see Figure 2). It would then have been obvious to one skilled in the art to apply the teachings of both **Sato** et al and **Ichikawa** to use standard vacuum deposition with resistance heating process to deposit the oxide layer for it is well know and standard practice in the art to form the film with this process.

Claim 18 has been amended to include features concerning forming a third film by the claimed steps. **Sato** et al teaches that the multi-layer anti-reflective film comprises a high/low refractive index layer alternative arrangement and comprises a *third layer material*, namely the high refractive index layer, that is made either of *tantalum oxide* (Ta_2O_5) or *zirconium oxide* (ZrO_2), as a major component, (please see column 5, line 42 to column 6 line 12). Sato et al teaches that the layer can be formed by vapor deposition process or vacuum deposition process, however it does not teach explicitly that it can also be formed by the plasma CVD process.

Nakahigashi et al in the same field of endeavor teaches that plasma *CVD film deposition method* is quite well known in the art. The process and the apparatus can be used to deposit film layer such as zirconium oxide (ZrO_2), tantalum oxide (Ta_2O_5) and titanium dioxide (TiO_2), (please see column 6, lines 60-62). The plasma CVD deposition apparatus and method including a *vacuum chamber* (10, Figures 15-16), an *electrode* (20) having a *substrate* (S1) placed on it, a film forming material is evaporated within the chamber using gas source supply (40) and an *radio* frequency power source (320) applied at the supply electrode (30) to convert the gas to *plasma* within the chamber, (please see columns 1-3). Nakahigashi et al teaches that the RF power is of a frequency of 13.56MHz. It would then have been obvious to one skilled in the art to use the standard plasma CVD film deposition process to deposit the high refractive index layer of the anti-reflective layer as an alternative method for forming the anti-reflection film since both the vacuum deposition method and plasma CVD deposition method are well known film forming process in the art to use one over the other would have been obvious matters of design choice to one skilled in the art for the benefit of making the process of making most suitable for the particular application desired.

With regard to claim 20, Sato et al teaches that multi-layer anti-reflective film comprises a high/low refractive index layer alternative arrangement and the *third layer material*, namely the high

refractive index layer, is made either of *tantalum oxide* (Ta_2O_5) or *zirconium oxide* (ZrO_2), as a major component, (please see column 5, line 42 to column 6 line 12).

Response to Arguments

6. Applicant's arguments filed on March 25, 2005 have been fully considered but they are not persuasive. The newly amended claims have been fully addressed and considered and they are rejected for the reasons stated above.

7. Applicant's arguments with respect to claims 1-5, and 8-10 have been considered but are moot in view of the new ground(s) of rejection.

8. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e. the third film has refractive index between 2.2 to 2.4 and the bias voltage not having negative means value and positive maximum values with respect to claim 18,) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US patent issued to Okaniwa (PN. 5,667,880) teaches explicitly that the high refractive index layer of the antireflective film has refractive index between 1.8 and 2.9.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Audrey Y. Chang
Primary Examiner
Art Unit 2872

A. Chang, Ph.D.